DeCELLE
BURKE
& Associates, Inc.

Site Engineering Report

for a

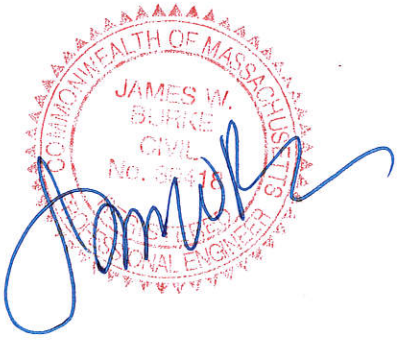
Proposed Apartment Building
at
2 Prescott Street and 39 Lincoln Street
in
Reading, Massachusetts

Prepared by:

DeCelle-Burke and Associates, Inc.
1266 Furnace Brook Parkway
Suite 401
Quincy, MA 02169

Prepared for:

Reading MKM, LLC
c/o KM Dover LLC
109 Oak Street, Suite G20
Newton, MA 02464



December 22, 2015

Table of Contents

Section 1 **Project Narrative**

Existing Conditions

The project locus, located at 2 Prescott Street and 39 Lincoln Street in Reading, Massachusetts, are two existing multi-story commercial/industrial buildings fronting on two streets with undefined on-site parking. The multi-lot property fronts on Lincoln Street and Prescott Street. The site is bordered to the north by the public ways previously mentioned and 31 Lincoln Street, an automotive repair garage, and to the west, south and east by multiple residential lots. The locus is zoned Residential Single Family 15 (S-15). The building currently provides business space for a moving company and one building is unoccupied.

The Assessor's lot identification for the two parcels is Map 16 Lots 224 and 226. The majority of the 36,255± square foot lots are impervious, with two existing structures and one large paved lot of approximately 23,227± square feet. The site is accessed from two existing curb cuts, one on Prescott and one on Lincoln Street. Parking for the buildings is provided by the large connected paved lot which is unpainted. No vertical curbing exists around the project site and bituminous concrete sidewalks are located along the entire frontage.

The Prescott Street building is serviced by public water, public sewer and overhead power and communications from the Prescott Street public layouts, The Lincoln Street building is serviced from the Lincoln Street layout. Although roof leaders are utilized for the existing building, no existing drainage is located at the site. The site drains overland uncontrolled into abutting streets and private properties.

This site is relatively flat with a general runoff from west to east. The lots have a minimal slope with the high point of 107.3'at the southwest corner and the low point of 104.8' located in the vicinity of the Lincoln Street curb cut. The plan datum is shown on the North American Vertical Datum of 1988 (NAVD 88).

There is no significant vegetation found on the site and site soils are defined by the Natural Resources Conservation Service (NRCS) as Merrimac sandy mix. These soils are excessively to well-drained soil. The site soils have been confirmed with two test pits, excavated on November 30, 2015, soils were noted to be HSG A soils and consistent with the record soil mapping.

Proposed Conditions

The proposed project includes two new buildings with 77 dwelling units with a connecting walking bridge. The proposed building use will be affordable apartments with surface parking under and around the buildings. The Prescott Street building will have a footprint of 17,380± square feet and the Lincoln Street building is 5,525± square foot building. Both buildings are proposed five-stories with the first level being parking on existing grade.

The parking lots under each building have two-way traffic lanes but they are connected by a one way drive the leads for the Prescott Street building toward a curb cut on Lincoln Street. The Prescott Street building has a sixty-two (62) space parking lot and the Lincoln Street building has an eighteen space (18) parking lot for a total of eighty (80) on-site parking spaces.

The surface parking lot is graded to provide positive drainage away from the abutters. One catch basin and one drain manhole is proposed to collect, treat and convey the stormwater runoff to the drain system located in Lincoln Street. The majority of the site's runoff will be generated for the roof. The roof runoff shall be collected separately and conveyed to an underground recharge facility located beneath each proposed building. Each system is designed specifically to contain the specific building's roof runoff. The underground leaching facility will utilizes Cultec Recharger 330XLHD chambers. The Prescott Street building system has thirty (30) units and the Lincoln Street system has ten (10) units with standard surrounding washed crushed stone. The roof runoff shall be conveyed to the system by internal building roof drains. The roof leaders include overflow bypasses. The system is designed to overflow during a 100-year storm event and the low gradient curb shall provide a controlled release into the drain system. All of other storm events are recharged into the ground.

The project shall also be serviced by a new sewer services, new fire protection and new domestic water services. Underground gas and power shall be extended on site as will communications. All services will be conveyed off of Lincoln Street via the drive way. The new domestic water services for both buildings are a 4-inch cement lined ductile iron pipe. The fire protection services are a 6-inch CLDI pipe. The sewer services shall be a 6-inch PVC sewer pipe with a direct tap to the public sewer closest to each building. Power and communications are coming from underground services currently found on Lincoln Street. Gas services for both buildings shall be provided off the gas main located on Lincoln Street.

All utility connections shall conform to town requirement and meet all utility purveyor requirements as well. The proposed drainage system meets current stormwater management regulations by reducing the off-site peak flow, providing for the recharge of roof runoff and providing for the removal of sediment and pollutants from entering the public storm drain system.

Massachusetts Stormwater Handbook Ten Standards Compliance

The proposed site stormwater controls decreases the stormwater runoff volume and peak flows for each storm event when compared to current conditions. This allows the project to be in compliance with Standard 2 the MassDEP Stormwater Management Requirements. The results of the calculations are tabulated below for comparison with the existing and proposed condition values. The project also complies with the other stormwater management standards outlined in the MassDEP Stormwater Management Requirements. The project complies with the following Standards:

Standard 1	-	No New stormwater conveyances discharge untreated stormwater directly to the waters of the Commonwealth;
Standard 2	-	Post Development peak discharge rates are less than pre-development;
Standard 3	-	The recharge volume required for this project is exceeded for the proposed impervious areas.
Standard 4-		The impervious area generated is roof and it is captured and recharged into the ground for all storm event. Roof runoff does not generate suspended soilds to control.
Standard 5	-	N/A
Standard 6	-	N/A
Standard 7-		The project is re-development and compliance with the Stormwater Management Standards is required to the maximum extent practicable. It is our belief that all Standards are met given the capture of the proposed roof runoff.
Standard 8	-	Erosion Control Plan is included in this report.
Standard 9	-	A Long Term Operation and Maintenance Plan is attached to this report.
Standard 10	-	Per Standard No. 10 of the MassDEP Stormwater Management Standards, there shall be no illicit discharges to the stormwater management system. It is strictly prohibited to discharge any products or substances onto the ground surface or into any drainage structures, such as catch basin inlets, manholes, recharge structures, water quality units, forebays, basin or drainage outlets that would be a detriment to the environment

It is our belief that the project complies with the Stormwater Management Standards to the maximum extent practicable. The project as proposed will protect the Abutters in the short term through proper construction and erosion protection techniques. It will also protect the environment form long term impacts due to the improved stormwater controls.

Stormwater Runoff Comparison Chart for Pre- and Post-Construction

2-Year Storm (3.25")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	**2.20**	Flow off-site	**0.44**

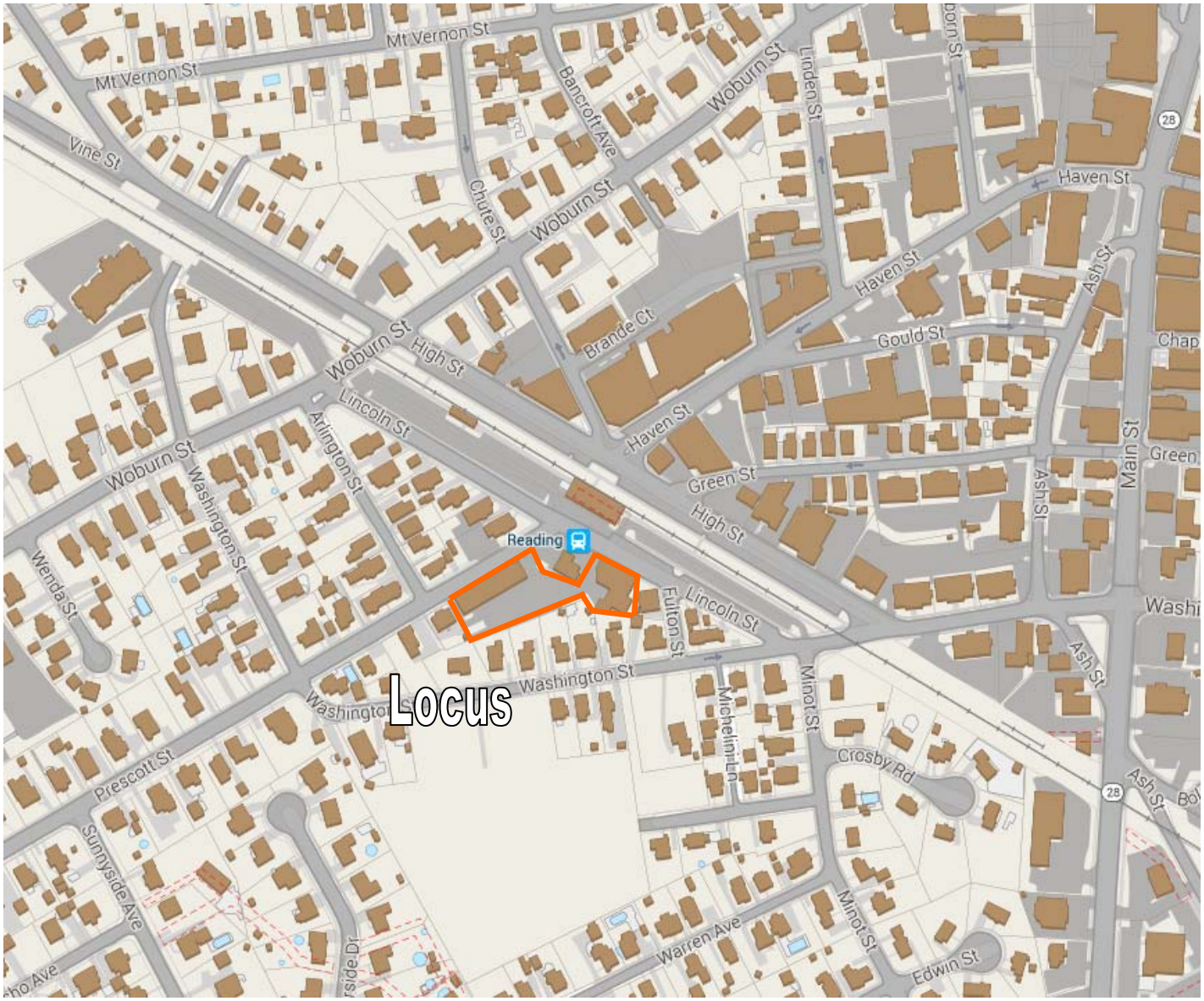
10-Year Storm (5.09")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	**3.53**	Flow off-site	**0.92**

25-Year Storm (6.23")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	**4.35**	Flow off-site	**1.55**

100-Year Storm (8.0")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	**5.62**	Flow off-site	**4.84**

Section 2 – Supporting Maps

Assessors Map
USGS Map
FEMA MAP
Soils Map



016.0-0000-0224.0, 016.0-0000-0226.0

DATE:	TITLE:	SCALE:
December 22, 2015	***ASSESSORS MAP***	***NOT TO SCALE***

PREPARED FOR:

Reading MKM, LLC
c/o KM Dover LLC
109 Oak Street, Suite G20
Newton, MA 02464

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& Associates, Inc.
1266 Furnace Brook Parkway Quincy, MA 02169
(617) 405-5100 (O) (617) 405-5101 (F)

PROJECT TITLE:

Proposed Apartment Building
2 Prescott St. & 39 Lincoln St.
Reading, MA 01867

DATE:	TITLE:	SCALE:
December 22, 2015	***USGS MAP***	***NOT TO SCALE***

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NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0313E

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 313 OF 656
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
READING, TOWN OF	250211	0313	E
STONEHAM, TOWN OF	250215	0313	E
WAKEFIELD, TOWN OF	250221	0313	E
WOBURN, CITY OF	250229	0313	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0313E

EFFECTIVE DATE
JUNE 4, 2010

Federal Emergency Management Agency

DATE:	TITLE:	SCALE:
December 22, 2015	***FEMA FLOOD MAP***	***NOT TO SCALE***

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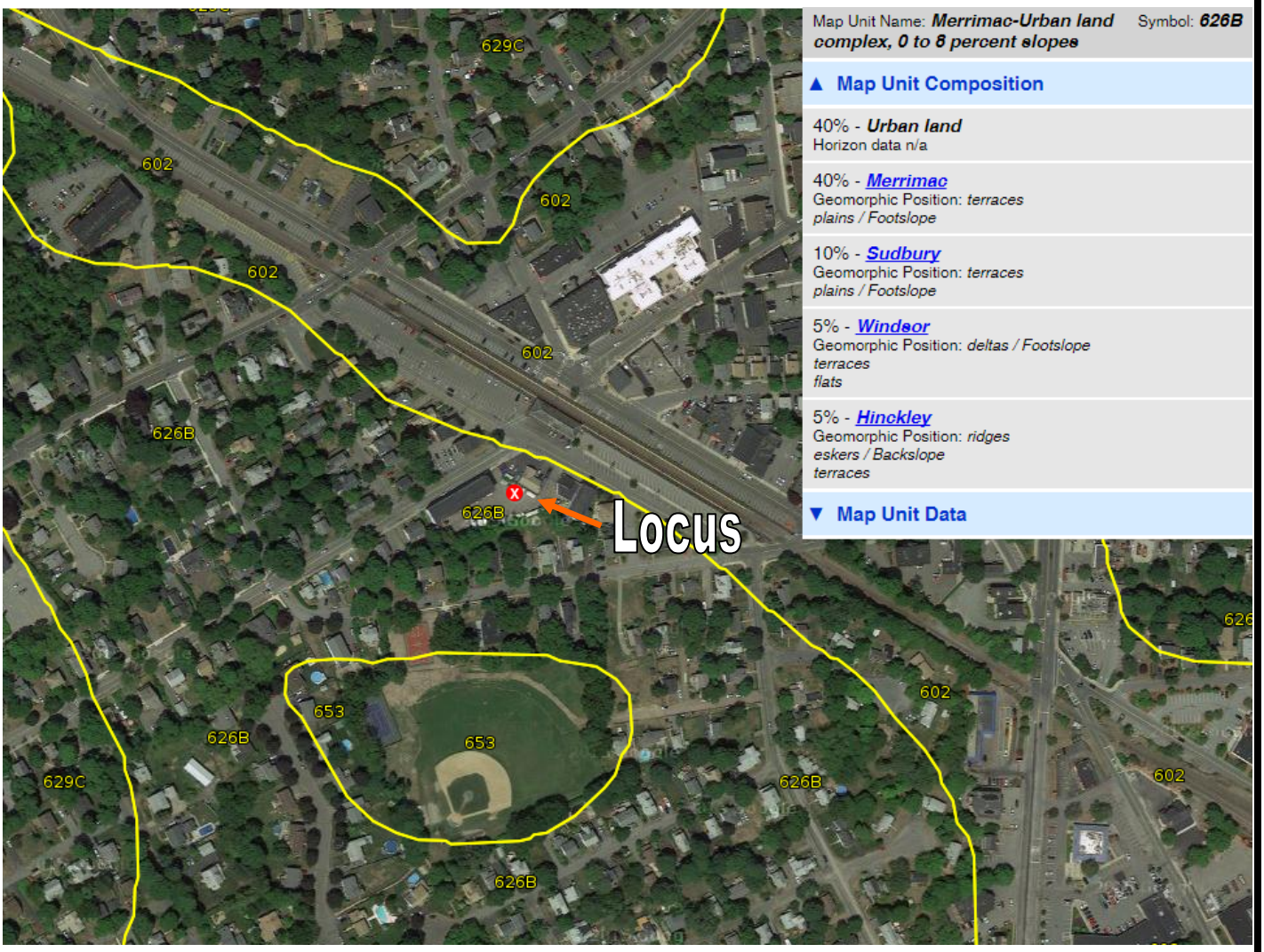

Map Unit Name: ***Merrimac-Urban land complex, 0 to 8 percent slopes*** Symbol: ***626B***

▲ Map Unit Composition

40% - ***Urban land***
Horizon data n/a

40% - ***Merrimac***
Geomorphic Position: *terraces*
plains / Footslope

10% - ***Sudbury***
Geomorphic Position: *terraces*
plains / Footslope

5% - ***Windsor***
Geomorphic Position: *deltas / Footslope*
terraces
flats

5% - ***Hinckley***
Geomorphic Position: *ridges*
eskers / Backslope
terraces

▼ Map Unit Data

Soils Map provided by a website maintained by the University of California-Davis and supported by the Natural Resources Conservation Service.

DATE:	TITLE:	SCALE:
December 22, 2015	***SOILS MAP***	***NOT TO SCALE***

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Section 3 – Stormwater Operation & Maintenance Plan Erosion Erosion & Sedimentation Control Plan

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Erosion and Sedimentation Control Plan
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Proposed Apartment Buildings
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1.0 - Plan Objectives

- Control existing, and potential erosion, sediment transport and pollutant impact events by installing and maintaining construction related Best Management Practices (BMP's) to reduce and/or prevent the discharge of stormwater pollutants into wetland resources of the Commonwealth of Massachusetts;

- To protect surface stormwater quality, ground water quality, and minimize off-site sediment transport into the wetland resources during construction;

- To prevent local and off-site flooding by controlling peak rates and volumes of stormwater runoff during construction; and

- To eliminate illicit discharges to municipal stormwater drainage systems that causes pollution during construction.

2.0 - Introduction

This Erosion and Sedimentation Control Plan (The "Plan") has been devised for the redevelopment of an existing commercial lot located at 2 Prescott Street and 39 Lincoln Street in Reading, Massachusetts. These two parcels are adjacent to one another at the corner of Prescott and Lincoln Streets. The purpose of the Plan is to protect the surrounding environment from contaminated stormwater during redevelopment. The stormwater will be treated before release and surfaces stabilized to minimize erosive events by implementing, installing and maintaining construction related Best Management Practices (BMP's) to reduce and/or prevent the discharge of stormwater pollutants and sediments into municipal stormwater systems and wetland resources of the Commonwealth of Massachusetts. The BMP's are described in the Stormwater Management Standards developed by the Massachusetts Department for Environmental Protection and it is our belief that short term construction related pollution prevention generated from this site can be achieved.

3.0 - Current Site Conditions

The project locus, located at 2 Prescott Street and 39 Lincoln Street in Reading, Massachusetts, are two existing multi-story commercial/industrial buildings fronting on two streets with undefined on-site parking. The multi-lot property fronts on Lincoln Street and Prescott Street. The site is bordered to the north by the public ways previously mentioned and 31 Lincoln Street, an automotive repair garage, and to the west, south and east by multiple residential lots. The locus is zoned Residential Single Family 15 (S-15). The building currently provides business space for a moving company and one building is unoccupied.

The Assessor's lot identification for the two parcels is Map 16 Lots 224 and 226. The majority of the 36,255± square foot lots are impervious, with two existing structures and one large paved lot of approximately 23,227± square feet. The site is accessed from two existing curb cuts, one on Prescott and one on Lincoln Street. Parking for the buildings is provided by the large connected paved lot which is unpainted. No vertical curbing exists around the project site and bituminous concrete sidewalks are located along the entire frontage.

The Prescott Street building is serviced by public water, public sewer and overhead power and communications from the Prescott Street public layouts, The Lincoln Street building is serviced from the Lincoln Street layout. Although roof leaders are utilized for the existing building, no existing drainage is located at the site. The site drains overland uncontrolled into abutting streets and private properties.

This site is relatively flat with a general runoff from west to east. The lots have a minimal slope with the high point of 107.3'at the southwest corner and the low point of 104.8' located in the vicinity of the Lincoln Street curb cut. The plan datum is shown on the North American Vertical Datum of 1988 (NAVD 88).

There is no significant vegetation found on the site and site soils are defined by the Natural Resources Conservation Service (NRCS) as Merrimac sandy mix. These soils are excessively to well-drained soil. The site soils have been confirmed with two test pits, excavated on November 30, 2015, soils were noted to be HSG A soils and consistent with the record soil mapping.

4.0 - Project Description

The proposed project includes two new buildings with 77 dwelling units with a connecting walking bridge. The proposed building use will be affordable apartments with surface parking under and around the buildings. The Prescott Street building will have a footprint of 17,380± square feet and the Lincoln Street building is 5,525± square foot building. Both buildings are proposed five-stories with the first level being parking on existing grade.

The parking lots under each building have two-way traffic lanes but they are connected by a one way drive the leads for the Prescott Street building toward a curb cut on Lincoln Street. The Prescott Street building has a sixty-two (62) space parking lot and the Lincoln Street building has an eighteen space (18) parking lot for a total of eighty (80) on-site parking spaces.

The surface parking lot is graded to provide positive drainage away from the abutters. One catch basin and one drain manhole is proposed to collect, treat and convey the stormwater runoff to the drain system located in Lincoln Street. The majority of the site's runoff will be generated for the roof. The roof runoff shall be collected separately and conveyed to an underground recharge facility located beneath each proposed building. Each system is designed specifically to contain the specific building's roof runoff. The underground leaching facility will utilizes Cultec Recharger 330XLHD chambers. The Prescott Street building system has thirty (30) units and the Lincoln Street system has ten (10) units with standard surrounding washed crushed stone. The roof runoff shall be conveyed to the system by internal building roof drains. The roof leaders include overflow bypasses. The system is designed to overflow during a 100-year storm event and the low gradient curb shall provide a controlled release into the drain system. All of other storm events are recharged into the ground.

The project shall also be serviced by a new sewer services, new fire protection and new domestic water services. Underground gas and power shall be extended on site as will communications. All services will be conveyed off of Lincoln Street via the drive way. The new domestic water services for both buildings are a 4-inch cement lined ductile iron pipe. The fire protection services are a 6-inch CLDI pipe. The sewer services shall be a 6-inch PVC sewer pipe with a direct tap to the public sewer closest to each building. Power and communications are coming from underground services currently found on Lincoln Street. Gas services for both buildings shall be provided off the gas main located on Lincoln Street.

All utility connections shall conform to town requirement and meet all utility purveyor requirements as well. The proposed drainage system meets current stormwater management regulations by reducing the off-site peak flow, providing for the recharge of roof runoff and providing for the removal of sediment and pollutants from entering the public storm drain system.

5.0 - Erosion & Sedimentation Control Plan

The contractor shall implement an Erosion and Sedimentation Control Plan that protects the surrounding environment from sediment laden stormwater runoff generated during construction activities and from other pollutants generated from construction activities such as litter and dust. Construction sequencing is part of managing a site as is implementing many BMP's that assist in controlling construction related pollutants.

5.1 - Major Construction Sequence for Site

The sequence is developed to contain all potential sedimentation and erosion incidents that could occur during the construction of the project. The contractor however is responsible to manage the site effectively to control offsite sediment transport which may

not be included in this plan. The sequence will coordinate the work within the erosion barrier and coordinate other sedimentation control features to reduce the stress upon a silt fence as well as limit off-site sediment transport. The sequencing is as follows:

- Place safety fence around property to limit access and protect the public.
- Place crushed stone apron at primary entrance to site.
- Place erosion control barrier at limit of work where possible.
- Install silt sacks in existing catch basins around site.
- Have water truck on-site for demolition process to minimize fugitive dust.
- Raze existing buildings; dispose of material in a legal manner.
- Remove existing bituminous concrete parking lot and dispose of in a legal manner.
- Rough grade lot to protect against unexpected construction site runoff.
- Excavate for drainage system. Remove deleterious material from excavation and to remove from site.
- Install proposed drainage system with silt sacks as required.
- Backfill and compact excavation as needed to construct drainage system in accordance with the approved plans. Place excavated soils as backfill for grading if possible to minimize stockpiled soils or have the unusable soils removed from the site.
- Excavate for building foundations, form foundations and backfill.
- Rough grade ground around building foundation and above drainage system and parking lot area to make sure site drains to new system.
- Install electrical and communication conduits. Backfill excavation as soon as possible to minimize stockpiled soils.
- Begin fine grade parking lot area.
- Place binder for parking lot.
- Install final landscaping, including hydro-seed, plantings, light poles, walkways and concrete pads.
- Install berms and final pave site.
- Clean up site.

The contractor has several procedures to perform to maintain the site. They include but are not limited to:

- Clean silt sacks of sediment as needed. All temporary erosion control to be inspected on a daily basis.
- Monitor daily, access points on Hancock Street for fugitive sediments and install temporary barriers or silt fences as necessary.
- Install temporary erosion barriers if expecting high volume of precipitation.
- Install/replace erosion control barrier at limit of work as needed. Barrier to be inspected on a weekly basis.
- Any stockpiled soils to be covered to minimize fugitive dust.
- Maintain a covered dumpster on site to minimize windblown debris from littering neighborhood and resource areas.

- Have a water truck onsite during the demolition portion of the project and during rough grading to minimize fugitive dust.

5.2 - Best Management Practices

The contractor shall use various types of structural and non-structural methodologies to minimize offsite polluting from construction activities. The following is a list of some BMP's that can be utilized, however, it is the contractor's responsibility to implement his strategies to minimize offsite sediment transport and fugitive dust and trash.

5.2.1 - Dumpster

The contractor shall have a dumpster on-site for the disposal of construction debris. The contractor shall cover the dumpster as needed to prevent windblown debris from becoming litter in the environment.

5.2.2 - Silt Collection and Filter Bags

The contractor shall install silt filters in the catch basins on site. They shall be inspected periodically for effectiveness and serviceability.

5.2.3 - Erosion Control Barrier

An erosion control barrier shall be installed at the Limit of Work and used around the site as needed. The barrier shall be used around soil stockpiles and localized excavations on site. The barrier needs to be effective in controlling sediment transport and not becoming strained as the project moves forward. The contractor shall inspect the barrier weekly or after a large storm event to identify any stressed areas and replace the barrier as needed. The barrier can be one or many of several types. Staked haybales, a geotextile fabric or a , geotextile erosion control sock are typical types of barriers. The contractor shall inspect the barriers on a daily basis and repair the barriers as needed.

5.2.4 - Dust Control

The use of a water truck or other method to spray water over the site during the dry season to minimize blown dust shall be implemented. The water shall not be excessively spread so erosive forces occur. The contractor shall sweep the pavement once installed and cover stockpiled soils as needed to minimize dust.

5.2.5 - Disturbed Surface Maintenance

The contractor shall stabilize the ground surface as needed to prevent erosion. Stabilization of surfaces includes the placement of pavement, rip rap, wood bark mulch and the establishment of vegetated surfaces. Upon the completion of construction of a particular phase, all surfaces should be stabilized even though it

is apparent that future construction efforts will cause their disturbance. Vegetated cover should be established during the proper growing season and should be enhanced by soil adjustment for proper pH, nutrients and moisture content. Surfaces that are disturbed by erosion processes or vandalism should be stabilized as soon as possible. Areas where construction activities have permanently or temporarily ceased should be stabilized within 14 days from the date of last construction activity, except when construction activity will resume within 21 days (e.g., the total time period that construction activity is temporarily ceased is less than 21 days). Hydro-mulching of grass surfaces is recommended, especially if seeding of the surfaces is required outside the normal growing season. Mulching may be used for temporary stabilization. Haybale dikes or silt fences should be set where required to trap products of erosion and should be maintained on a continuing basis during the construction process. During periods of intense precipitation temporary barriers like haybales, dikes or silt fences should be constructed to entrap the sediment.

5.2.6 - Temporary Stormwater Controls

The contractor shall rough grade the site as to not concentrate the stormwater runoff and cause erosive forces. The contractor shall use a temporary stormwater control device to treat construction site runoff for suspended solids. The catch basins and manholes can be installed to assist in capturing the construction site runoff. Once installed, the catch basins will need to be cleaned out of all sediment before connecting to the recharge system and final paving. The contractor shall sweep the pavement once installed as needed to minimize suspended solids in the stormwater.

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Stormwater Operation & Site Maintenance Plan
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Proposed Apartment Buildings
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in
Reading, Massachusetts

Prepared by:

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December 22, 2015

Introduction

This Stormwater Operation & Maintenance Plan (OMP) has been devised for the redevelopment of an existing commercial lot located at 2 Prescott Street and 39 Lincoln Street in Reading, Massachusetts. The OMP is outlined below to provide long term operation and maintenance procedures of the stormwater controls installed to manage the stormwater flow generated on the site and improve runoff quality. The landowners are required to implement the procedures and ensure the long term benefits of the stormwater controls approved and installed for this project. The OMP provides simple operational and maintenance procedures for the stormwater control structures as well as perform various tasks to remove pollutants from areas that would have potential to be picked up on site and moved via stormwater offsite.

The landowners shall be responsible to inspect, maintain and operate the stormwater management system as well as inspect the grounds for eroded areas and collected pollutants. Appointing a responsible person in charge to implement this OMP on behalf of the landowner is preferred but the landowners shall be responsible at all times for implementing this OMP. The purpose of the OMP is to maintain the long term benefits from the Stormwater Management features constructed that support groundwater recharge and pollution prevention.

Responsible Party - Reading MKM, LLC
c/o KM Dover LLC
109 Oak Street, Suite G20
Newton, MA 02464

The responsible party listed above is responsible for inspecting, maintaining and keeping copies of maintenance records for the following plan and will be referred to as the Site Manager for the remainder of this report. If another individual/company is responsible for the every day management of the property the name and contact information shall be made available to the Reading Department of Public Works. The responsible party can expect a yearly budget of $1,200 to $1,600 per year to maintain the site. The responsible party will be referenced as the Manager throughout the rest of this OMP.

Non-Structural Operations

Parking Lot Sweeping

Parking Lot sweeping will be performed twice during the year, in April-May and in September-October. The Site Manager shall contract with a property management company that provides street sweeping services. The contractor shall be a company in good standing in the Commonwealth of Massachusetts and experienced in performing these services. All sweepings shall be disposed of by the hired company off-site in a legal manner.

Snow Management

Proper snow management practices will be implemented to minimize runoff and pollutant loading impacts. Plowed snow will be placed in pervious areas at the edges of the parking lot where it can slowly infiltrate. Plowed snow will be placed on to pervious areas that are not subject to excessive shade from buildings or vegetation. All accumulated sediment from snowmelt shall be removed each spring. If excessive snow inhibits movement around the site or the stormwater management facilities the contractor will be responsible to remove the snow from the site and disposed of in a legal manner. Care must be taken to reduce impact to vegetation in the snow storage areas.

Structural Operations

Catch Basin and Deep Sump Drain Manhole

A catch basin was installed to remove trash, debris, sediment and a percentage of grease and oil from stormwater. The stormwater runoff will go through the first structural phase of sediment removal. The catch basin allows for sediment collection from the ground runoff and remove said particles prior to entry into the drain manholes and then into the recharge system. The second phase of particle removal is the drain manhole. After passing through the manhole the suspended particles will be significantly reduced. Oil and grease will float on the surface of the pooled water and be trapped by an inverted elbow. To ensure maximum capacity and efficiency, the sumps will be cleaned when half of the available capacity of the deep sump has been used or at a minimum of once per year. The Manager shall inspect the manhole sumps at least twice per year. The Manager shall hire a contractor in good standing in the Commonwealth of Massachusetts with experience in cleaning stormwater sumps with a vacuum truck. All sediment and water retrieved from the tanks shall be shall be disposed of by the hired company off-site in a legal manner. The Manager shall provide a written inspection report of which an example form is attached.

Underground Cultec Chambers

The underground Cultec chambers were installed to recharge stormwater runoff from the roof of the buildings. The benefit of this structural stormwater BMP is the roof does not generate any sediment. The removal of particles from this runoff is not necessary and allows for long term life of the system with limited care. The Manager shall, however, check for sedimentation or ponding within the chamber. Sedimentation and ponding will impact the recharge capabilities of the chamber. The chambers shall be inspected a minimum of twice per year or if other evidence requires more frequent inspections such as consistent overflows or breakout is observed. The Manager shall hire a contractor in good standing in the Commonwealth of Massachusetts with experience in cleaning stormwater structures with a vacuum truck. All sediment and water retrieved from the chambers shall be shall be disposed of by the hired company off-site in a legal manner. The Manager shall provide a written inspection report of which an example form is attached..

Site Management

The site shall be inspected on a quarterly basis for rutting, potholes, broken berms, depressions eroded areas and any other site damage caused by vehicular or human activity. The landscaped areas shall be raked as necessary to maintain their grade. Grassed areas shall be raked out and seeded as needed to maintain an even vegetated surface. The Manager shall hire a contractor in good standing in the Commonwealth of Massachusetts with experience in paving to repair any potholes, broken berms or other damaged paved area. The Manager shall hire a landscaper in good standing in the Commonwealth of Massachusetts with experience in re-vegetating eroded areas.

Record Keeping

Records of the inspections and maintenance for the Non-Structural and Structural Operations performed or organized by Manager for the property shall be up to date and available for review and inspection. An example record keeping sheet is attached.

2 Prescott & 39 Lincoln Street Apartment Buildings

Stormwater Operation & Site Maintenance Plan

INSPECTION SCHEDULE AND EVALUATION CHECKLIST

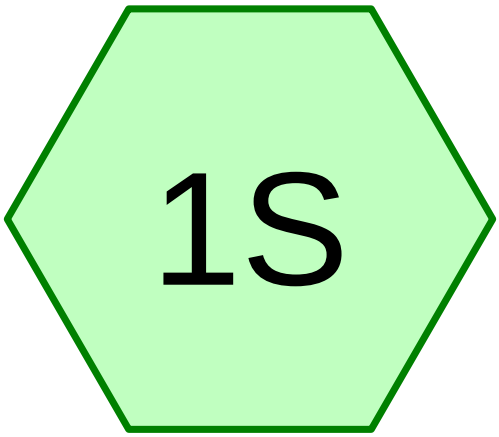
Best Management Practice	Inspection Frequency	Date Inspected	Contractor	Current Conditions and Minimum Maintenance / Repairs, if necessary	Completed Maintenance / Repair (i.e. date, contractor, tasks complete, etc...)
Site Sweeping	Biannual				
Catch Basin and Drain Manhole cleaning	Annual				
Underground Cultec Chambers	Biannual				
Parking Lot	Biannaul				
Vegetated Areas	Biannaul				
Overall Site Condition	Biannaul				

Property Manager: _____ **Date** _____

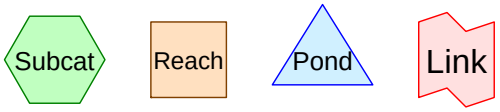
Section 4 **HydroCAD Calculations**

Existing Conditions
- **2-Year**
- **10-Year**
- **25-Year**
- **100-Year**

Proposed Conditions
- **2-Year**
- **10-Year**
- **25-Year**
- **100-Year**



Existing Conditions



Routing Diagram for xc
Prepared by Microsoft, Printed 12/22/2015

Summary for Subcatchment 1S: Existing Conditions

Runoff = 2.20 cfs @ 12.14 hrs, Volume= 0.183 af, Depth> 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.25"

Area (sf)	CN	Description
5,770	98	Roofs, HSG A
5,864	98	Roofs, HSG A
1,398	49	50-75% Grass cover, Fair, HSG A
23,227	98	Paved parking, HSG A
36,259	96	Weighted Average
1,398		3.86% Pervious Area
34,861		96.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 1S: Existing Conditions

Runoff = 3.53 cfs @ 12.14 hrs, Volume= 0.301 af, Depth> 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.09"

Area (sf)	CN	Description
5,770	98	Roofs, HSG A
5,864	98	Roofs, HSG A
1,398	49	50-75% Grass cover, Fair, HSG A
23,227	98	Paved parking, HSG A
36,259	96	Weighted Average
1,398		3.86% Pervious Area
34,861		96.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 1S: Existing Conditions

Runoff = 4.35 cfs @ 12.14 hrs, Volume= 0.373 af, Depth> 5.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=6.23"

Area (sf)	CN	Description
5,770	98	Roofs, HSG A
5,864	98	Roofs, HSG A
1,398	49	50-75% Grass cover, Fair, HSG A
23,227	98	Paved parking, HSG A
36,259	96	Weighted Average
1,398		3.86% Pervious Area
34,861		96.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

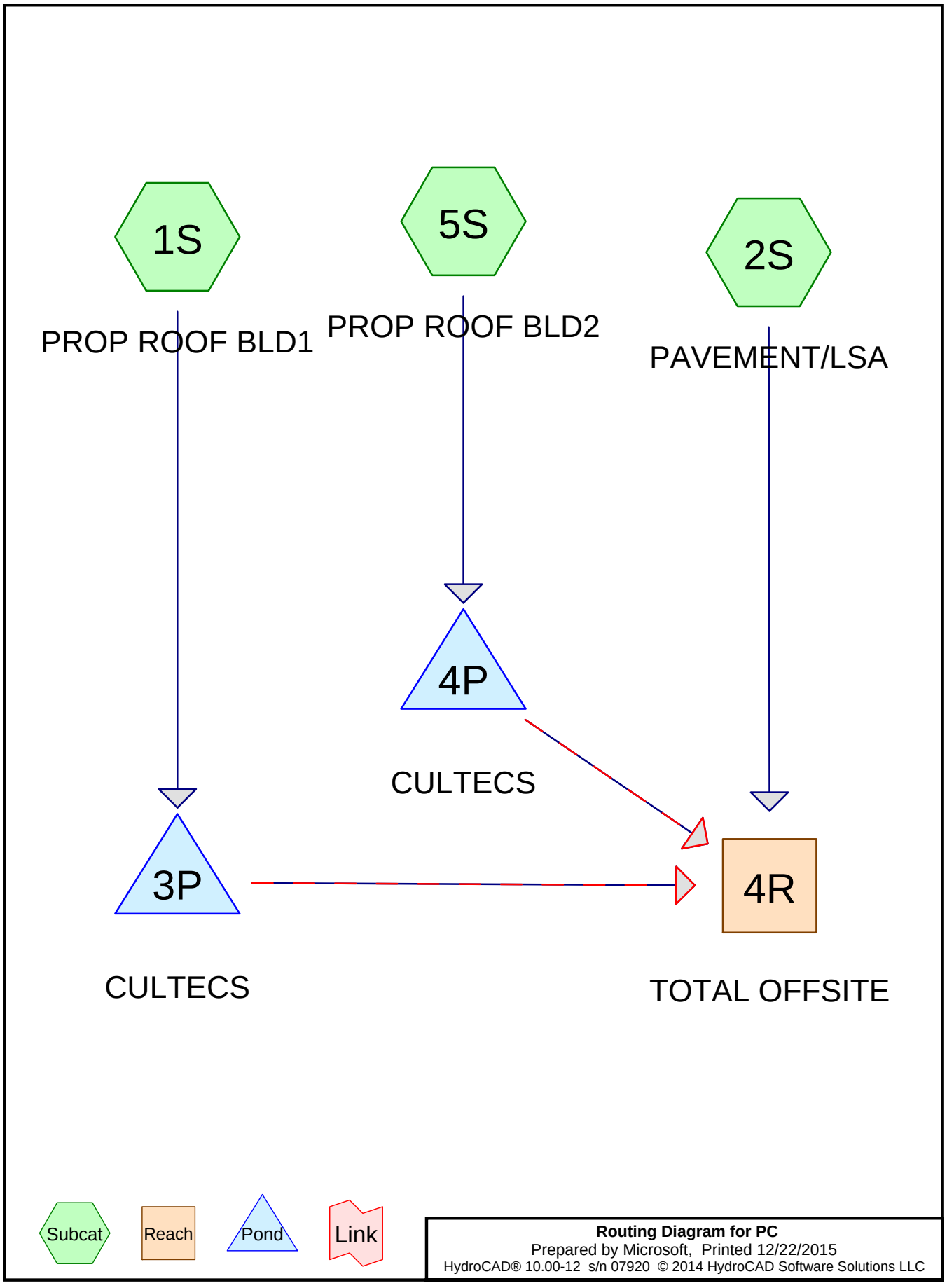
Summary for Subcatchment 1S: Existing Conditions

Runoff = 5.62 cfs @ 12.14 hrs, Volume= 0.486 af, Depth> 7.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=8.00"

Area (sf)	CN	Description
5,770	98	Roofs, HSG A
5,864	98	Roofs, HSG A
1,398	49	50-75% Grass cover, Fair, HSG A
23,227	98	Paved parking, HSG A
36,259	96	Weighted Average
1,398		3.86% Pervious Area
34,861		96.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**



Routing Diagram for PC
Prepared by Microsoft, Printed 12/22/2015

Summary for Subcatchment 1S: PROP ROOF BLD1

Runoff = 1.09 cfs @ 12.14 hrs, Volume= 0.094 af, Depth> 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.25"

Area (sf)	CN	Description
17,380	98	Roofs, HSG A
17,380		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 2S: PAVEMENT/LSA

Runoff = 0.44 cfs @ 12.15 hrs, Volume= 0.034 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.25"

Area (sf)	CN	Description
8,324	98	Paved parking, HSG A
5,027	49	50-75% Grass cover, Fair, HSG A
13,351	80	Weighted Average
5,027		37.65% Pervious Area
8,324		62.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 5S: PROP ROOF BLD2

Runoff = 0.35 cfs @ 12.14 hrs, Volume= 0.030 af, Depth> 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.25"

Area (sf)	CN	Description
5,525	98	Roofs, HSG A
5,525		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Reach 4R: TOTAL OFFSITE

Inflow Area = 0.832 ac, 86.13% Impervious, Inflow Depth > 0.49"
Inflow = 0.44 cfs @ 12.15 hrs, Volume= 0.034 af
Outflow = 0.44 cfs @ 12.15 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: CULTECS

Inflow Area = 0.399 ac,100.00% Impervious, Inflow Depth > 2.82"
Inflow = 1.09 cfs @ 12.14 hrs, Volume= 0.094 af
Outflow = 0.24 cfs @ 12.59 hrs, Volume= 0.093 af, Atten= 78%, Lag= 27.3 min
Discarded = 0.24 cfs @ 12.59 hrs, Volume= 0.093 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 103.50' @ 12.59 hrs Surf.Area= 1,212 sf Storage= 1,209 cf

Plug-Flow detention time= 38.7 min calculated for 0.093 af (100% of inflow)
Center-of-Mass det. time= 36.4 min (777.8 - 741.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	102.00'	1,082 cf	**11.17'W x 108.50'L x 3.54'H Field A** 4,291 cf Overall - 1,587 cf Embedded = 2,704 cf x 40.0% Voids
#2A	102.50'	1,587 cf	**Cultec R-330XLHD** x 30 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
#3	104.00'	34 cf	**0.66'D x 50.00'H Vertical Cone/Cylinder** x 2 -Impervious
		2,703 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	108.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.24 cfs @ 12.59 hrs HW=103.50' (Free Discharge)
1=Exfiltration (Controls 0.24 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=102.00' (Free Discharge)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond 4P: CULTECS

Inflow Area = 0.127 ac,100.00% Impervious, Inflow Depth > 2.82"
Inflow = 0.35 cfs @ 12.14 hrs, Volume= 0.030 af
Outflow = 0.08 cfs @ 12.56 hrs, Volume= 0.030 af, Atten= 76%, Lag= 25.6 min
Discarded = 0.08 cfs @ 12.56 hrs, Volume= 0.030 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 103.32' @ 12.56 hrs Surf.Area= 430 sf Storage= 364 cf

Plug-Flow detention time= 33.7 min calculated for 0.030 af (99% of inflow)
Center-of-Mass det. time= 31.4 min (772.8 - 741.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	102.00'	391 cf	**11.17'W x 38.50'L x 3.54'H Field A** 1,523 cf Overall - 544 cf Embedded = 979 cf x 40.0% Voids
#2A	102.50'	544 cf	**Cultec R-330XLHD** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
#3	104.00'	34 cf	**0.66'D x 50.00'H Vertical Cone/Cylinder** x 2 -Impervious
		970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	108.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.08 cfs @ 12.56 hrs HW=103.32' (Free Discharge)
1=Exfiltration (Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=102.00' (Free Discharge)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Subcatchment 1S: PROP ROOF BLD1

Runoff = 1.72 cfs @ 12.14 hrs, Volume= 0.150 af, Depth> 4.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.09"

Area (sf)	CN	Description
17,380	98	Roofs, HSG A
17,380		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 2S: PAVEMENT/LSA

Runoff = 0.92 cfs @ 12.14 hrs, Volume= 0.071 af, Depth> 2.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.09"

Area (sf)	CN	Description
8,324	98	Paved parking, HSG A
5,027	49	50-75% Grass cover, Fair, HSG A
13,351	80	Weighted Average
5,027		37.65% Pervious Area
8,324		62.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 5S: PROP ROOF BLD2

Runoff = 0.55 cfs @ 12.14 hrs, Volume= 0.048 af, Depth> 4.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.09"

Area (sf)	CN	Description
5,525	98	Roofs, HSG A
5,525		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Reach 4R: TOTAL OFFSITE

Inflow Area = 0.832 ac, 86.13% Impervious, Inflow Depth > 1.02"
Inflow = 0.92 cfs @ 12.14 hrs, Volume= 0.071 af
Outflow = 0.92 cfs @ 12.14 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: CULTECS

Inflow Area = 0.399 ac,100.00% Impervious, Inflow Depth > 4.50"
Inflow = 1.72 cfs @ 12.14 hrs, Volume= 0.150 af
Outflow = 0.24 cfs @ 12.75 hrs, Volume= 0.149 af, Atten= 86%, Lag= 36.7 min
Discarded = 0.24 cfs @ 12.75 hrs, Volume= 0.149 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 104.82' @ 12.75 hrs Surf.Area= 1,212 sf Storage= 2,309 cf

Plug-Flow detention time= 73.7 min calculated for 0.149 af (100% of inflow)
Center-of-Mass det. time= 71.4 min (809.3 - 737.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	102.00'	1,082 cf	**11.17'W x 108.50'L x 3.54'H Field A** 4,291 cf Overall - 1,587 cf Embedded = 2,704 cf x 40.0% Voids
#2A	102.50'	1,587 cf	**Cultec R-330XLHD** x 30 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
#3	104.00'	34 cf	**0.66'D x 50.00'H Vertical Cone/Cylinder** x 2 -Impervious
		2,703 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	108.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.24 cfs @ 12.75 hrs HW=104.82' (Free Discharge)
1=Exfiltration (Controls 0.24 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=102.00' (Free Discharge)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond 4P: CULTECS

Inflow Area = 0.127 ac,100.00% Impervious, Inflow Depth > 4.50"
Inflow = 0.55 cfs @ 12.14 hrs, Volume= 0.048 af
Outflow = 0.08 cfs @ 12.69 hrs, Volume= 0.047 af, Atten= 85%, Lag= 33.4 min
Discarded = 0.08 cfs @ 12.69 hrs, Volume= 0.047 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 104.40' @ 12.69 hrs Surf.Area= 430 sf Storage= 704 cf

Plug-Flow detention time= 62.8 min calculated for 0.047 af (99% of inflow)
Center-of-Mass det. time= 60.3 min (798.3 - 737.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	102.00'	391 cf	**11.17'W x 38.50'L x 3.54'H Field A** 1,523 cf Overall - 544 cf Embedded = 979 cf x 40.0% Voids
#2A	102.50'	544 cf	**Cultec R-330XLHD** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
#3	104.00'	34 cf	**0.66'D x 50.00'H Vertical Cone/Cylinder** x 2 -Impervious
		970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	108.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.08 cfs @ 12.69 hrs HW=104.40' (Free Discharge)
1=Exfiltration (Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=102.00' (Free Discharge)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Subcatchment 1S: PROP ROOF BLD1

Runoff = 2.11 cfs @ 12.14 hrs, Volume= 0.184 af, Depth> 5.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=6.23"

Area (sf)	CN	Description
17,380	98	Roofs, HSG A
17,380		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 2S: PAVEMENT/LSA

Runoff = 1.23 cfs @ 12.14 hrs, Volume= 0.095 af, Depth> 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=6.23"

Area (sf)	CN	Description
8,324	98	Paved parking, HSG A
5,027	49	50-75% Grass cover, Fair, HSG A
13,351	80	Weighted Average
5,027		37.65% Pervious Area
8,324		62.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 5S: PROP ROOF BLD2

Runoff = 0.67 cfs @ 12.14 hrs, Volume= 0.059 af, Depth> 5.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=6.23"

Area (sf)	CN	Description
5,525	98	Roofs, HSG A
5,525		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Reach 4R: TOTAL OFFSITE

Inflow Area = 0.832 ac, 86.13% Impervious, Inflow Depth > 1.50"
Inflow = 1.55 cfs @ 12.45 hrs, Volume= 0.104 af
Outflow = 1.55 cfs @ 12.45 hrs, Volume= 0.104 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: CULTECS

Inflow Area = 0.399 ac,100.00% Impervious, Inflow Depth > 5.54"
Inflow = 2.11 cfs @ 12.14 hrs, Volume= 0.184 af
Outflow = 1.30 cfs @ 12.45 hrs, Volume= 0.183 af, Atten= 38%, Lag= 18.8 min
Discarded = 0.25 cfs @ 12.43 hrs, Volume= 0.175 af
Primary = 1.06 cfs @ 12.45 hrs, Volume= 0.008 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 108.84' @ 12.43 hrs Surf.Area= 1,212 sf Storage= 2,672 cf

Plug-Flow detention time= 83.6 min calculated for 0.183 af (100% of inflow)
Center-of-Mass det. time= 81.3 min (818.2 - 736.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	102.00'	1,082 cf	**11.17'W x 108.50'L x 3.54'H Field A** 4,291 cf Overall - 1,587 cf Embedded = 2,704 cf x 40.0% Voids
#2A	102.50'	1,587 cf	**Cultec R-330XLHD** x 30 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
#3	104.00'	34 cf	**0.66'D x 50.00'H Vertical Cone/Cylinder** x 2 -Impervious
		2,703 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	108.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.25 cfs @ 12.43 hrs HW=108.42' (Free Discharge)
1=Exfiltration (Controls 0.25 cfs)

Primary OutFlow Max=1.12 cfs @ 12.45 hrs HW=108.60' (Free Discharge)
2=Orifice/Grate (Orifice Controls 1.12 cfs @ 2.85 fps)

Summary for Pond 4P: CULTECS

Inflow Area = 0.127 ac,100.00% Impervious, Inflow Depth > 5.54"
Inflow = 0.67 cfs @ 12.14 hrs, Volume= 0.059 af
Outflow = 0.09 cfs @ 12.81 hrs, Volume= 0.058 af, Atten= 87%, Lag= 40.4 min
Discarded = 0.09 cfs @ 12.81 hrs, Volume= 0.058 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 105.51' @ 12.81 hrs Surf.Area= 430 sf Storage= 931 cf

Plug-Flow detention time= 84.7 min calculated for 0.058 af (99% of inflow)
Center-of-Mass det. time= 82.1 min (819.1 - 736.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	102.00'	391 cf	**11.17'W x 38.50'L x 3.54'H Field A** 1,523 cf Overall - 544 cf Embedded = 979 cf x 40.0% Voids
#2A	102.50'	544 cf	**Cultec R-330XLHD** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
#3	104.00'	34 cf	**0.66'D x 50.00'H Vertical Cone/Cylinder** x 2 -Impervious
		970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	108.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.09 cfs @ 12.81 hrs HW=105.51' (Free Discharge)
1=Exfiltration (Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=102.00' (Free Discharge)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Subcatchment 1S: PROP ROOF BLD1

Runoff = 2.71 cfs @ 12.14 hrs, Volume= 0.238 af, Depth> 7.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=8.00"

Area (sf)	CN	Description
17,380	98	Roofs, HSG A
17,380		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 2S: PAVEMENT/LSA

Runoff = 1.72 cfs @ 12.14 hrs, Volume= 0.135 af, Depth> 5.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=8.00"

Area (sf)	CN	Description
8,324	98	Paved parking, HSG A
5,027	49	50-75% Grass cover, Fair, HSG A
13,351	80	Weighted Average
5,027		37.65% Pervious Area
8,324		62.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment 5S: PROP ROOF BLD2

Runoff = 0.86 cfs @ 12.14 hrs, Volume= 0.076 af, Depth> 7.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=8.00"

Area (sf)	CN	Description
5,525	98	Roofs, HSG A
5,525		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Reach 4R: TOTAL OFFSITE

Inflow Area = 0.832 ac, 86.13% Impervious, Inflow Depth > 2.60"
Inflow = 4.84 cfs @ 12.25 hrs, Volume= 0.180 af
Outflow = 4.84 cfs @ 12.25 hrs, Volume= 0.180 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: CULTECS

Inflow Area = 0.399 ac,100.00% Impervious, Inflow Depth > 7.14"
Inflow = 2.71 cfs @ 12.14 hrs, Volume= 0.238 af
Outflow = 3.87 cfs @ 12.25 hrs, Volume= 0.236 af, Atten= 0%, Lag= 6.8 min
Discarded = 0.25 cfs @ 12.24 hrs, Volume= 0.200 af
Primary = 3.61 cfs @ 12.25 hrs, Volume= 0.037 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 111.99' @ 12.24 hrs Surf.Area= 1,212 sf Storage= 2,674 cf

Plug-Flow detention time= 77.2 min calculated for 0.236 af (99% of inflow)
Center-of-Mass det. time= 74.6 min (810.6 - 736.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	102.00'	1,082 cf	**11.17'W x 108.50'L x 3.54'H Field A** 4,291 cf Overall - 1,587 cf Embedded = 2,704 cf x 40.0% Voids
#2A	102.50'	1,587 cf	**Cultec R-330XLHD** x 30 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
#3	104.00'	34 cf	**0.66'D x 50.00'H Vertical Cone/Cylinder** x 2 -Impervious
		2,703 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	108.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.25 cfs @ 12.24 hrs HW=111.42' (Free Discharge)
1=Exfiltration (Controls 0.25 cfs)

Primary OutFlow Max=3.61 cfs @ 12.25 hrs HW=111.89' (Free Discharge)
2=Orifice/Grate (Orifice Controls 3.61 cfs @ 9.19 fps)

Summary for Pond 4P: CULTECS

Inflow Area = 0.127 ac,100.00% Impervious, Inflow Depth > 7.14"
Inflow = 0.86 cfs @ 12.14 hrs, Volume= 0.076 af
Outflow = 0.91 cfs @ 12.30 hrs, Volume= 0.075 af, Atten= 0%, Lag= 9.8 min
Discarded = 0.09 cfs @ 12.30 hrs, Volume= 0.067 af
Primary = 0.83 cfs @ 12.30 hrs, Volume= 0.008 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 108.50' @ 12.30 hrs Surf.Area= 430 sf Storage= 938 cf

Plug-Flow detention time= 78.7 min calculated for 0.075 af (99% of inflow)
Center-of-Mass det. time= 76.2 min (812.1 - 736.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	102.00'	391 cf	**11.17'W x 38.50'L x 3.54'H Field A** 1,523 cf Overall - 544 cf Embedded = 979 cf x 40.0% Voids
#2A	102.50'	544 cf	**Cultec R-330XLHD** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
#3	104.00'	34 cf	**0.66'D x 50.00'H Vertical Cone/Cylinder** x 2 -Impervious
		970 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 0.00'
#2	Primary	108.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600

Discarded OutFlow Max=0.09 cfs @ 12.30 hrs HW=108.50' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.09 cfs)

Primary OutFlow Max=0.94 cfs @ 12.30 hrs HW=108.50' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.94 cfs @ 2.40 fps)